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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/625,810	07/22/2003	Erik Lier	040092-020010US	7770

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EXAMINER	
ALEMU, EPHREM	
ART UNIT	**PAPER NUMBER**
2821	

DATE MAILED: 12/17/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/625,810	LIER ET AL.	
	Examiner	Art Unit	
	Ephrem Alemu	2821	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *13 April 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-60* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-60* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *8-28-03*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Objections

1. Claims 21 and 51 are objected to because of the following informalities: In claims 21 and 51, respectively, "wherein the first antenna element type" lacks a proper antecedent basis since there are at least two "first antenna element type" claimed above, applicant need to clearly identify whether the "wherein the first antenna element type" is referring to the first antenna array or the second antenna array or both. Appropriate correction is required.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-2, 12-14, 16-18, 28 and 29 are rejected under 35 U.S.C. 102(e) as being anticipated by Sreenivas et al. (US 6,795,020).

Re claims 1 and 2, Sreenivas discloses an antenna, comprising:

a first antenna array (i.e., first array 112, 312), (Figs. 1, 3) comprising:

one or more antenna elements (i.e., radiator elements 104, 304, 108, 308) of a first antenna element type (108, 308) in a first region (i.e., second area 136, 336) of the antenna array (312); and

a plurality of antenna elements of a second antenna element type (i.e., radiator elements 104, 304) in a second region (i.e., first area 132, 332) of the antenna array (i.e., first array 112,

312); wherein the first region (i.e., second area 136, 336) of the first antenna array (i.e., first array 112, 312) is a central region, and the second region of the first antenna array (i.e., first array 112, 312) is a region outside of the central region (Figs. 1, 3; Col. 7, line 14- Col. 8, line 48).

Re claims 12-14, Sreenivas further discloses a second antenna array (i.e., second array 116, 316) comprising one or more antenna elements (i.e., radiator elements 304, 308); wherein at least the one or more antenna elements (i.e., radiator elements 104, 304, 108, 308) of the second antenna array (i.e., second array 116, 316) comprise antenna elements of the first or second antenna element type (i.e., radiator elements 104, 304, 108, 308) (Figs. 1, 3; Col. 7, line 14- Col. 8, line 48).

Re claims 16-18, Sreenivas further discloses the second antenna array (i.e., second array 116, 316) has a coincident or overlapping frequency band as the first antenna array (i.e., first array 112, 312); wherein the one or more antenna elements (i.e., radiator elements 104, 304) of the second antenna array (i.e., second array 116, 316) are interleaved with at least a portion of the antenna elements (i.e., radiator elements 108, 308) of the first antenna array (i.e., first array 112, 312); and wherein the antenna elements (i.e., radiator elements 108, 308) of the first antenna array (i.e., first array 112, 312) that are interleaved with the one or more antenna elements (i.e., radiator elements 104, 304) of the second antenna array (i.e., second array 116, 316) are of the first antenna element type, and at least a portion of the antenna elements (i.e., radiator elements 108, 308) of the first antenna array (i.e., first array 112, 312) that are not interleaved with the one or more antenna elements (i.e., radiator elements 104, 304) of the second antenna array (i.e.,

second array 116, 316) are of the second antenna element type (Figs. 1, 3; Col. 7, line 51- Col. 8, line 48).

Re claims 28 and 29, Sreenivas further discloses at least one of the first antenna array and the second antenna array comprises an active phased array antenna (i.e., active antenna system) (Figs. 1A-1C, 9; Col. 5, lines 53- Col. 6, line 19; Col. 12, lines 37-62).

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 3-11, 15, 19-27 and 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Sreenivas (US 6,795,020) in view of Lalezari (US 5,838,282).

Re claims 3, 4, 5, 6-11, 15, 19, 20, 21, 22-25, 30 and 31-60, Sreenivas does not disclose the one or more antenna elements of the first or second antenna array comprise antenna elements of the first antenna element type and the second antenna element type, the first antenna array comprising a third antenna element type and a specific configuration of the antenna with a spacecraft. However, Sreenivas teaches of providing phased array capable of providing multiple operating frequencies and of directing towards a particular area of the Earth in a minimal area required by the antenna (Figs. 1A-1C, 9; Col. 5, lines 53- Col. 6, line 19; Col. 12, lines 37-62).

In the same field of endeavor, Lalezari discloses an antenna system 22 mounted on a spacecraft (satellite 12) comprising one or more antenna elements of a first or second antenna array comprising antenna elements of the first antenna element type (i.e., patch antenna) and the

second antenna element type (i.e., helical elements) for the purpose of achieving desired antenna pattern shapes in all relevant frequency band. Lalezari, further disclose the antenna array comprising a third antenna element type. In addition, Lalezari teaches the first and second antenna array may each include any type of radiating element, which is capable of operating in the respective frequency range (Col. 2, lines 16-65; Col. 5, line 26- Col. 6, line 6; Col. 10, line 15- Col. 11, line 10).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide one or more antenna elements of Sreenivas second antenna array with the first antenna element type (i.e., patch antenna) and the second antenna element type (i.e., helical elements) as taught by Lalezari for the purpose of achieving desired antenna pattern shapes in all relevant frequency band. In addition configuring the antenna array on a spacecraft as claimed in 3, 4,7, 9, 20, 22 would have been an obvious design choice, for example see Cherrette et al. (US 5,870,063) cited by applicant. Furthermore, it would have been well in the skill of an artisan to use a helical antenna element type of a first length for the first antenna element of the first or second antenna array and use a helical antenna element type of a second length for the second antenna element of the first or second antenna array which is capable of operating in the respective frequency range as taught by Lalezari (Col. 2, lines 16-65).

Re claims 26 and 27, given Sreenivas modified by Lalezari antenna system, the first antenna array comprising a Navigation Warfare global Positioning system antenna and the second array comprising Earth Coverage Global Positioning System antenna would have been obvious since Lalezari discloses that each of the separate arrays in the antenna system are

adapted for operation in a separate frequency band, and as such include radiating elements tunes for that frequency band.

Re claims 31 and 32, Sreenivas discloses an antenna system for a spacecraft (i.e., satellite), comprising:

a first antenna array (i.e., first array 112, 312), (Figs. 1, 3) comprising:

one or more antenna elements (i.e., radiator elements 104, 304, 108, 308) of a first antenna element type (108, 308) in a first region (i.e., second area 136, 336) of the antenna array (312); and

a plurality of antenna elements of a second antenna element type (i.e., radiator elements 104, 304) in a second region (i.e., first area 132, 332) of the antenna array (i.e., first array 112, 312); wherein the first region (i.e., second area 136, 336) of the first antenna array (i.e., first array 112, 312) is a central region, and the second region of the first antenna array (i.e., first array 112, 312) is a region outside of the central region (Figs. 1, 3; Col. 7, line 14- Col. 8, line 48).

Although Sreenivas does not show the spacecraft (i.e., satellite) comprising a space craft bus, Sreenivas teaches and discloses the antenna system as described above capable of operating at multiple frequencies that is relatively compact and that occupies a relatively small surface area. Lalezari discloses a spacecraft (i.e., satellite 12) comprising a spacecraft bus and array antenna coupled to the spacecraft bus (Fig. 1).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide Sreenivas antenna system a spacecraft (i.e., satellite 12) comprising a spacecraft bus as disclosed by Lalezari for no other reason than providing high gain

in both first and second center frequencies for the purpose minimizing coupling and losses due to close proximity of the antenna elements.

Re claims 42-44, Sreenivas further discloses a second antenna array (i.e., second array 116, 316) comprising one or more antenna elements (i.e., radiator elements 304, 308); wherein at least the one or more antenna elements (i.e., radiator elements 104, 304, 108, 308) of the second antenna array (i.e., second array 116, 316) comprise antenna elements of the first or second antenna element type (i.e., radiator elements 104, 304, 108, 308) (Figs. 1, 3; Col. 7, line 14- Col. 8, line 48).

Re claims 46-48, Sreenivas further discloses the second antenna array (i.e., second array 116, 316) has a coincident or overlapping frequency band as the first antenna array (i.e., first array 112, 312); wherein the one or more antenna elements (i.e., radiator elements 104, 304) of the second antenna array (i.e., second array 116, 316) are interleaved with at least a portion of the antenna elements (i.e., radiator elements 108, 308) of the first antenna array (i.e., first array 112, 312); and wherein the antenna elements (i.e., radiator elements 108, 308) of the first antenna array (i.e., first array 112, 312) that are interleaved with the one or more antenna elements (i.e., radiator elements 104, 304) of the second antenna array (i.e., second array 116, 316) are of the first antenna element type, and at least a portion of the antenna elements (i.e., radiator elements 108, 308) of the first antenna array (i.e., first array 112, 312) that are not interleaved with the one or more antenna elements (i.e., radiator elements 104, 304) of the second antenna array (i.e., second array 116, 316) are of the second antenna element type (Figs. 1, 3; Col. 7, line 51- Col. 8, line 48).

Re claims 58 and 59, Sreenivas further discloses at least one of the first antenna array and the second antenna array comprises an active phased array antenna (i.e., active antenna system) (Figs. 1A-1C, 9; Col. 5, lines 53- Col. 6, line 19; Col. 12, lines 37-62).

Re claims 33, 34, 35, 36-41, 45, 49, 50, 51, 52-55 and 60, Sreenivas does not disclose the one or more antenna elements of the first or second antenna array comprise antenna elements of the first antenna element type and the second antenna element type, the first antenna array comprising a third antenna element type and a specific configuration of the antenna with a spacecraft. However, Sreenivas teaches of providing phased array capable of providing multiple operating frequencies and of directing towards a particular area of the Earth in a minimal area required by the antenna (Figs. 1A-1C, 9; Col. 5, lines 53- Col. 6, line 19; Col. 12, lines 37-62).

In the same field of endeavor, Lalezari discloses an antenna system 22 mounted on a spacecraft (satellite 12) comprising one or more antenna elements of a first or second antenna array comprising antenna elements of the first antenna element type (i.e., patch antenna) and the second antenna element type (i.e., helical elements) for the purpose of achieving desired antenna pattern shapes in all relevant frequency band. Lalezari, further disclose the antenna array comprising a third antenna element type. In addition, Lalezari teaches the first and second antenna array may each include any type of radiating element, which is capable of operating in the respective frequency range (Col. 2, lines 16-65; Col. 5, line 26- Col. 6, line 6; Col. 10, line 15- Col. 11, line 10).

It would have been obvious to one having ordinary skill in the art at the time the invention was made to provide one or more antenna elements of Sreenivas second antenna array with the first antenna element type (i.e., patch antenna) and the second antenna element type

(i.e., helical elements) as taught by Lalezari for the purpose of achieving desired antenna pattern shapes in all relevant frequency band. In addition configuring the antenna array on a spacecraft as claimed in 3, 4,7, 9, 20, 22 would have been an obvious design choice, for example see Cherrette et al. (US 5,870,063) cited by applicant. Furthermore, it would have been well in the skill of an artisan to use a helical antenna element type of a first length for the first antenna element of the first or second antenna array and use a helical antenna element type of a second length for the second antenna element of the first or second antenna array which is capable of operating in the respective frequency range as taught by Lalezari (Col. 2, lines 16-65).

Re claims 26 and 27, given Sreenivas modified by Lalezari antenna system, the first antenna array comprising a Navigation Warfare global Positioning system antenna and the second array comprising Earth Coverage Global Positioning System antenna would have been obvious since Lalezari discloses that each of the separate arrays in the antenna system are adapted for operation in a separate frequency band, and as such include radiating elements tunes for that frequency band (Col. 2, lines 16-35).

Conclusion

6. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Killen (US 6,646,614); Goldstein et al. (US 6,243,052); Raguenet et al. (US 5,434,580); and Praba (US 5,258,771); also teach similar inventive subject matter.

Correspondence

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ephrem Alemu whose telephone number is (571) 272-1818. The examiner can normally be reached on M-F Flex hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Don K Wong can be reached on (571) 272-1834. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

EA
12-12-04

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